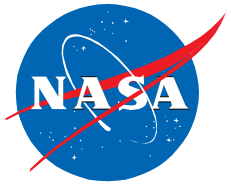
https://ntrs.nasa.gov/search.jsp?R=20170006094 2020-05-10T01:06:11+00:00Z



Subject Matter Expert Evaluation of Multi-Flight Common Route Advisories

Karl Bilimoria, Miwa Hayashi, and Kapil Sheth

NASA Ames Research Center

AIAA Aviation, Technology, Integration, and Operations Conference

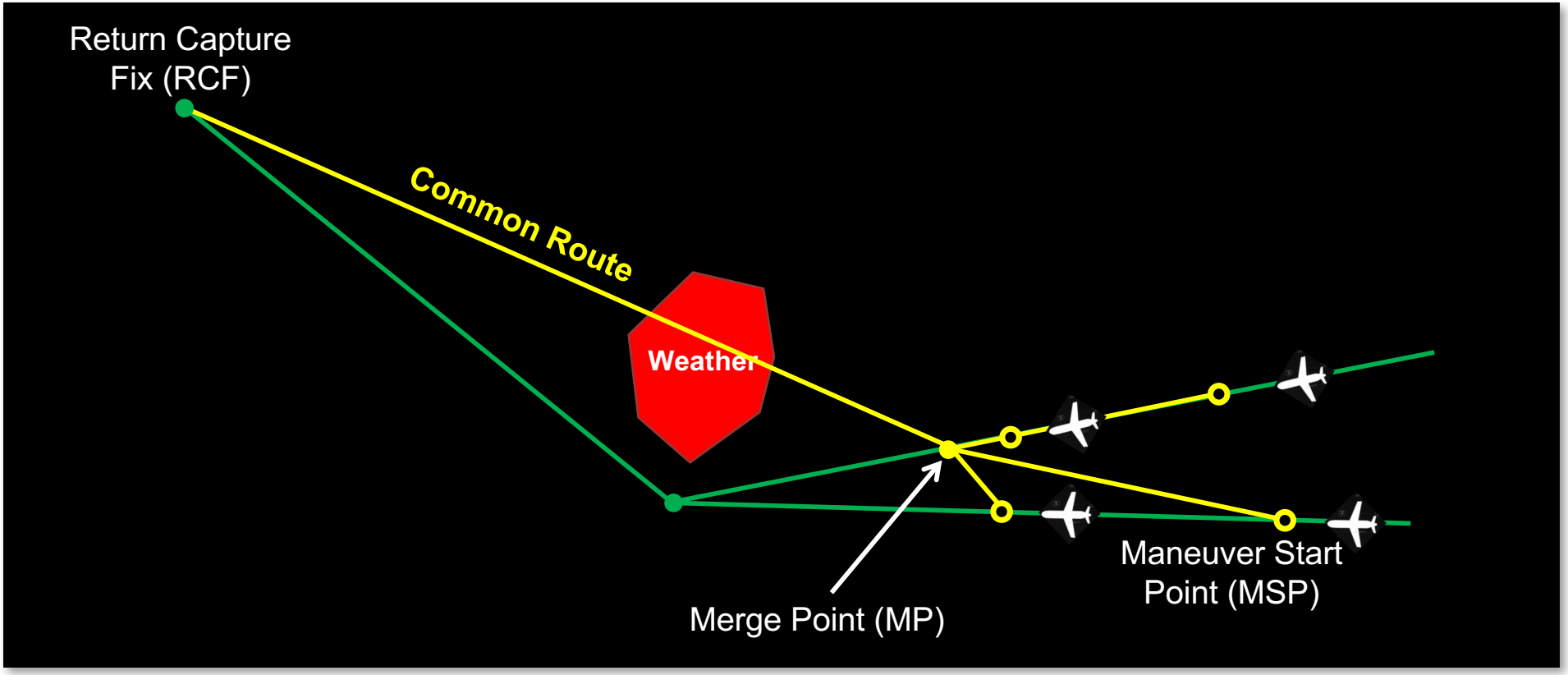
Denver, CO
5 – 9 June 2017

Outline

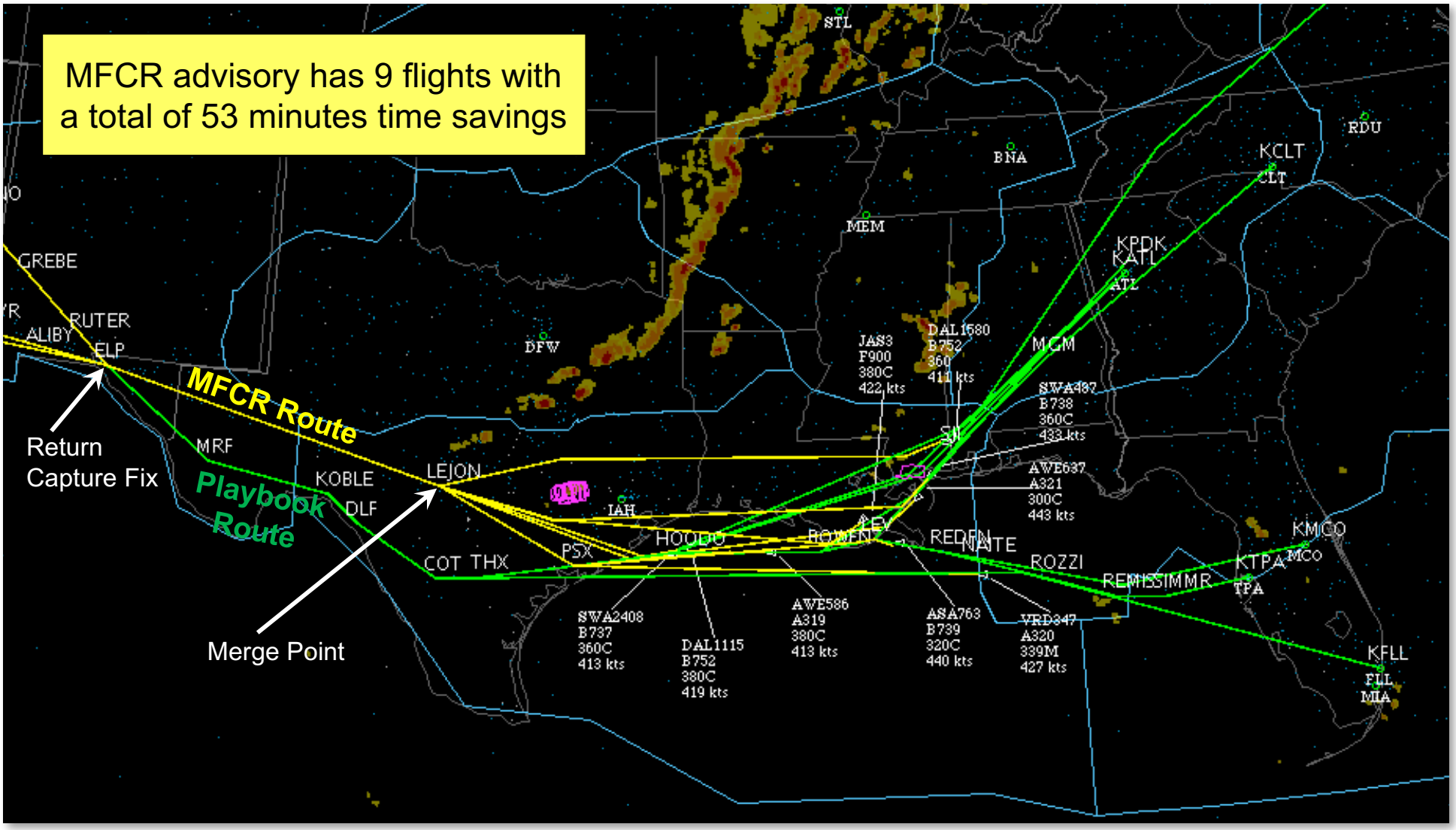
- Background on Multi-Flight Common Routes (MFCR)
- Subject Matter Expert evaluation of MFCR
- Key results
- Conclusions

Background

Multi-Flight Common Routes (MFCR) identifies opportunities for delay recovery by refreshing outdated routes



Example MFCR Advisory



MFCR Features

- MFCR merges multiple flights to a common route, creating a new flow for increased operational acceptability
- Each route segment is clear of weather
- Each flight has time savings of at least 3 minutes
- Total flight time savings for group is at least 10 minutes
- MFCR provides graphical functionality for review and modification prior to implementation of advisory

Overview of Evaluation

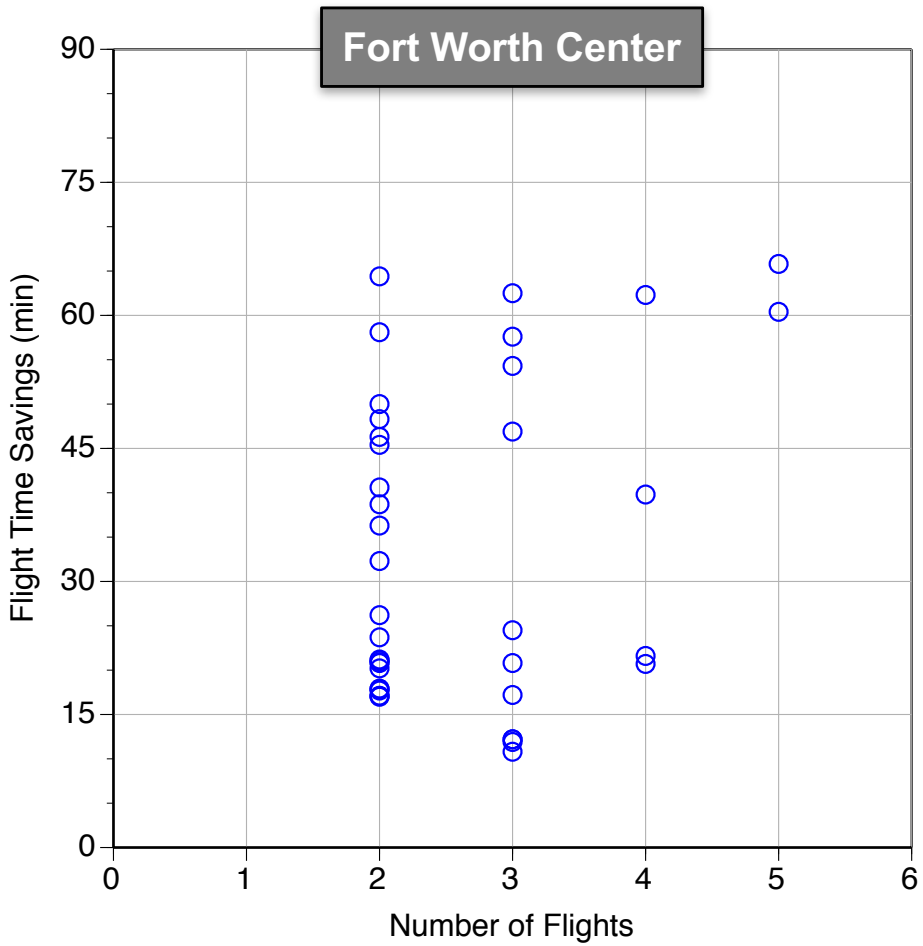
- Laboratory evaluation, conducted 1 – 4 Nov 2016

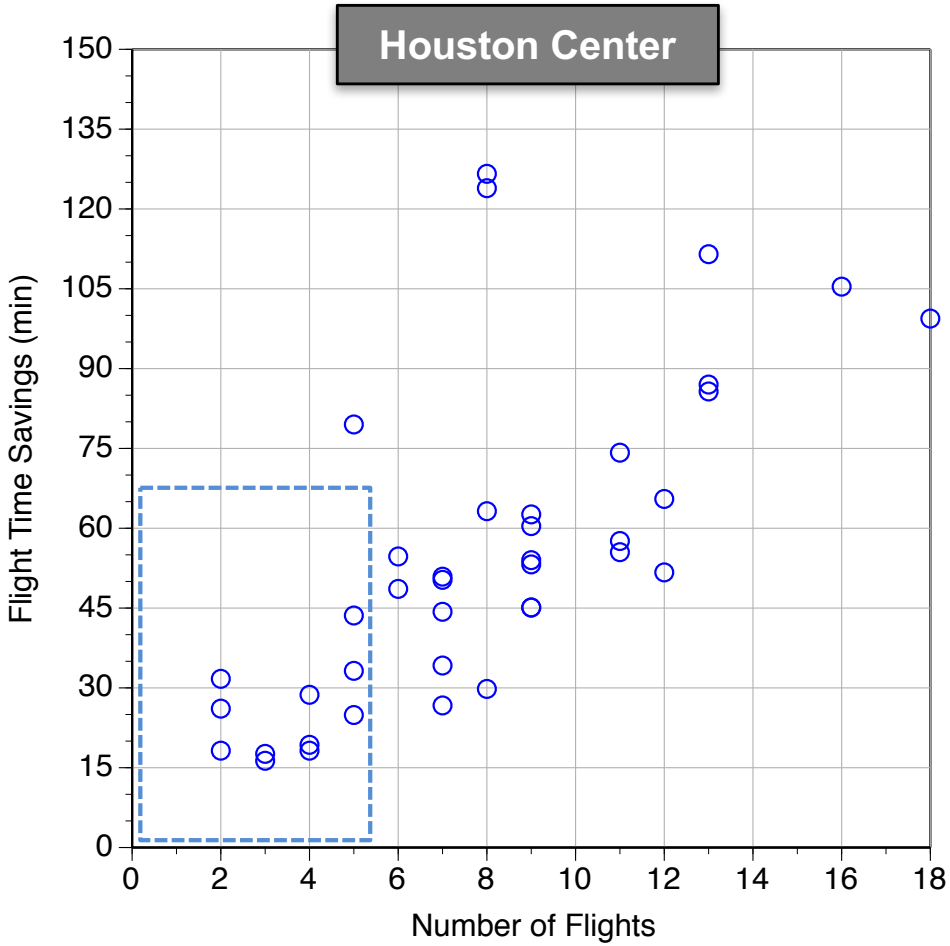
- Five subject matter experts (SMEs) evaluated scenarios in Fort Worth Center (ZFW) & Houston Center (ZHU) airspace
  - SMEs were recently retired traffic managers
  - Each SME evaluated 40 scenarios
  - Each scenario featured a static MFCR advisory

- Obtained SME feedback on:
  - Operational acceptability of MFCR re-route advisories
  - Workload and situational awareness
  - User interface
  - Viability of overall MFCR concept of operations

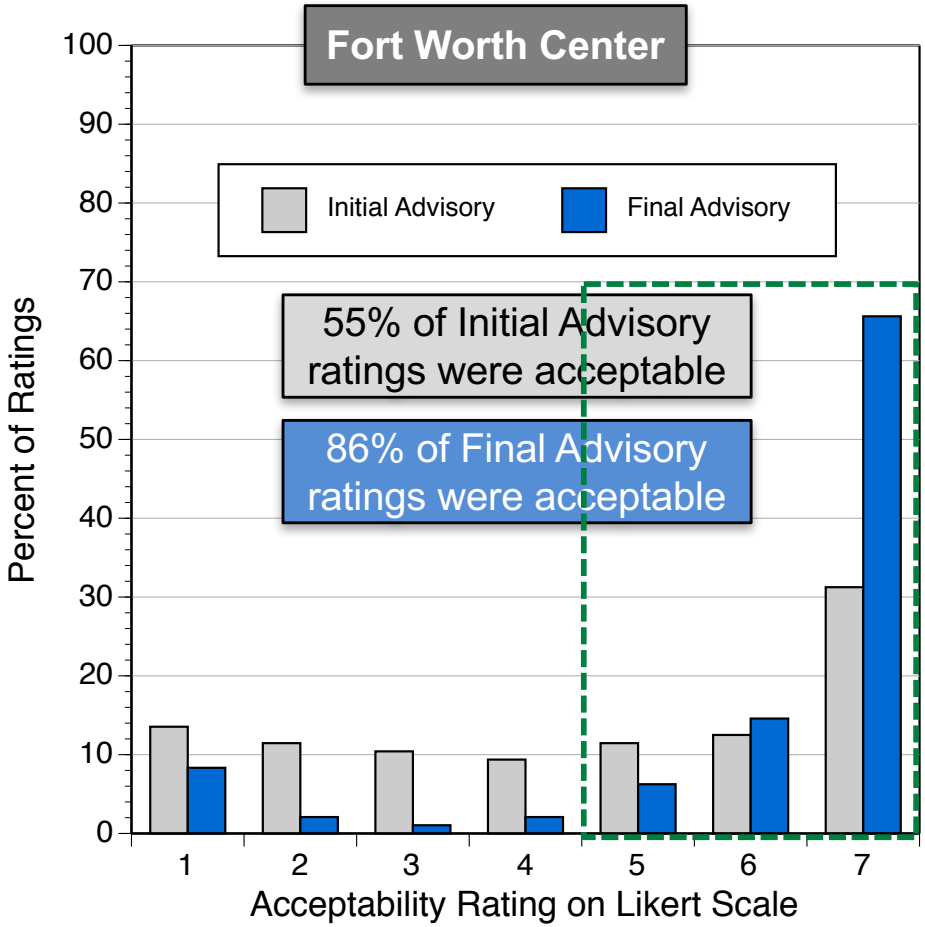
MFCR Advisory Parameters

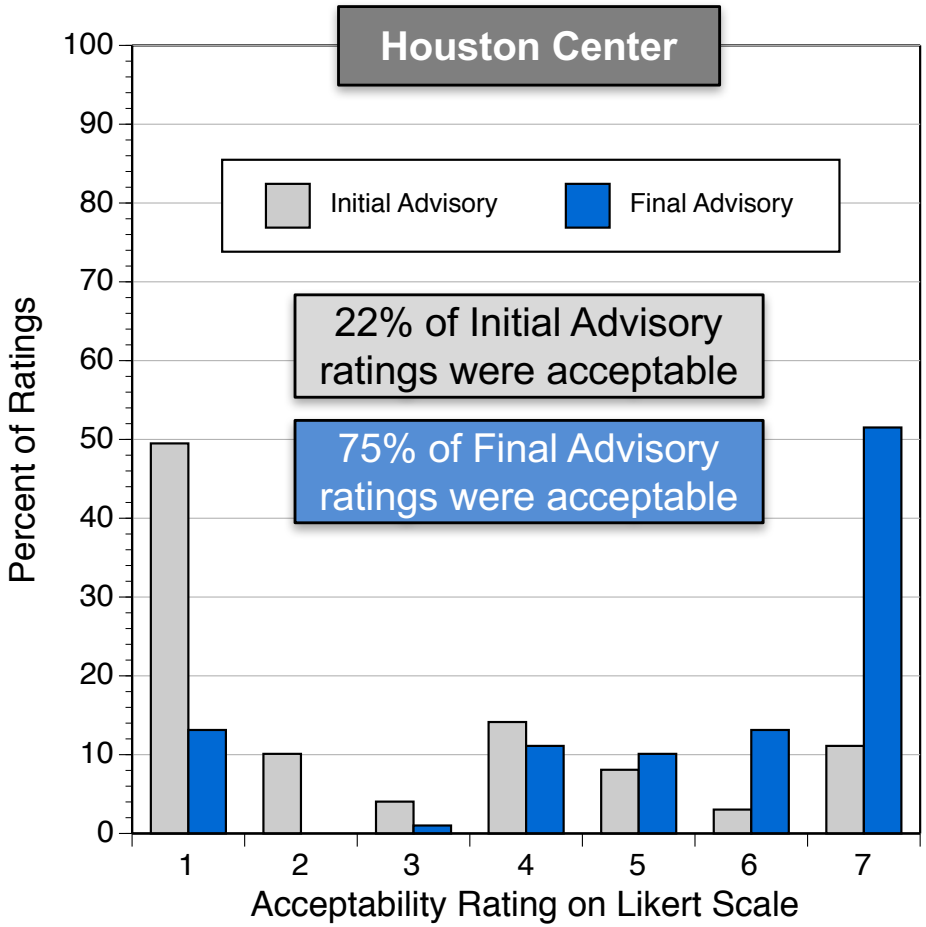
Houston Center advisories generally featured more flights than Fort Worth Center advisories





Acceptability Ratings





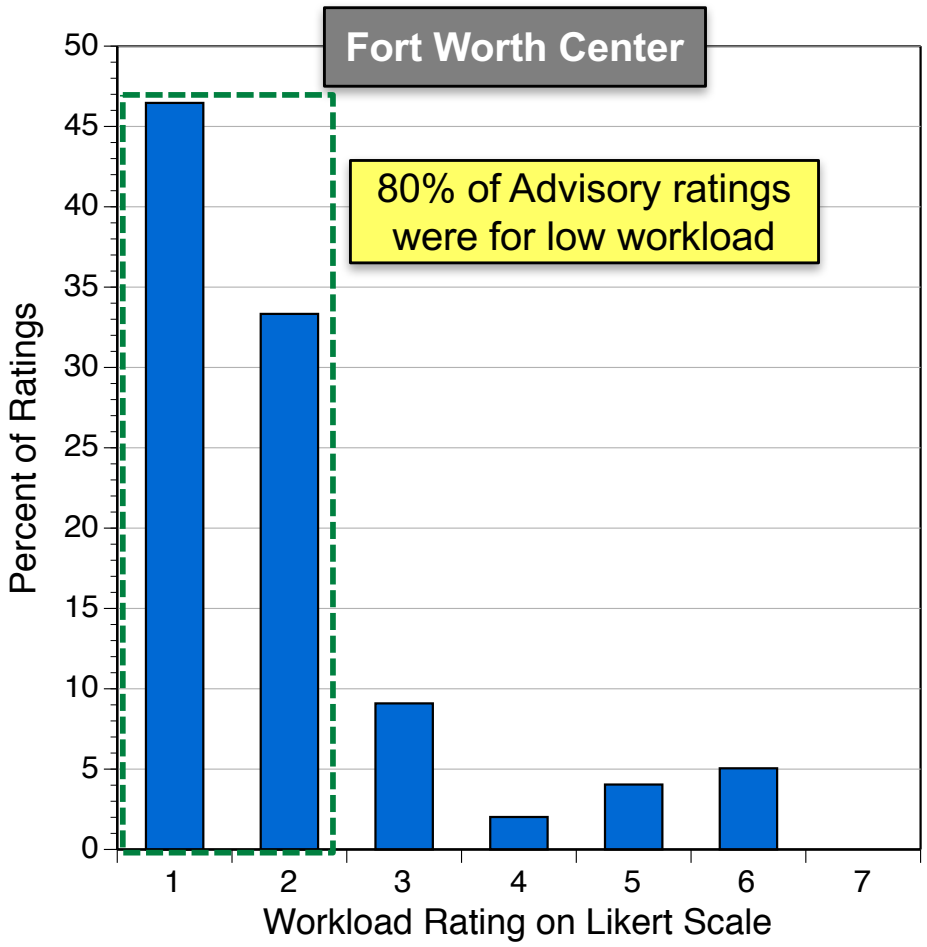
Comments on Acceptability

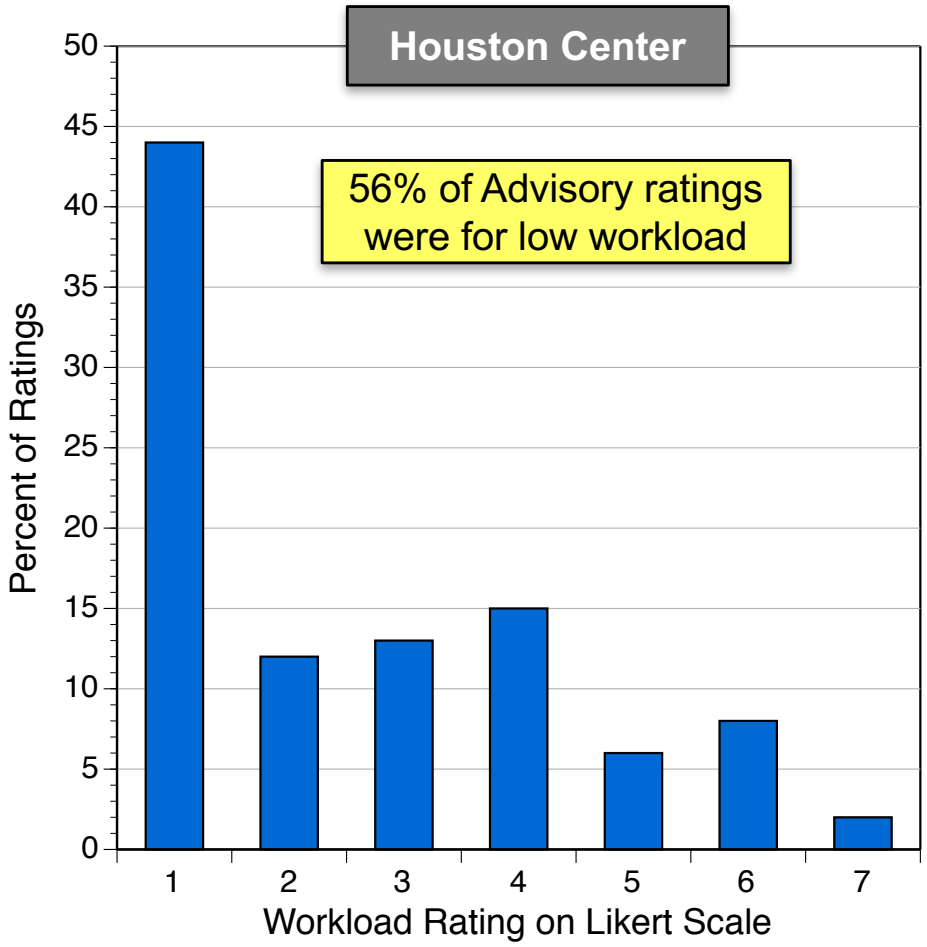
- Most advisories that were initially rated as low acceptability were rated as high acceptability after SME modification

- Modifications often corrected undesirable sector traversal
  - Route runs close to sector (or Center) boundary
  - Route cuts across corner of sector(s)
  - Route crosses arrival/departure flows
  - Route crosses congested sector(s)
  - Route does not conform with standard flow patterns

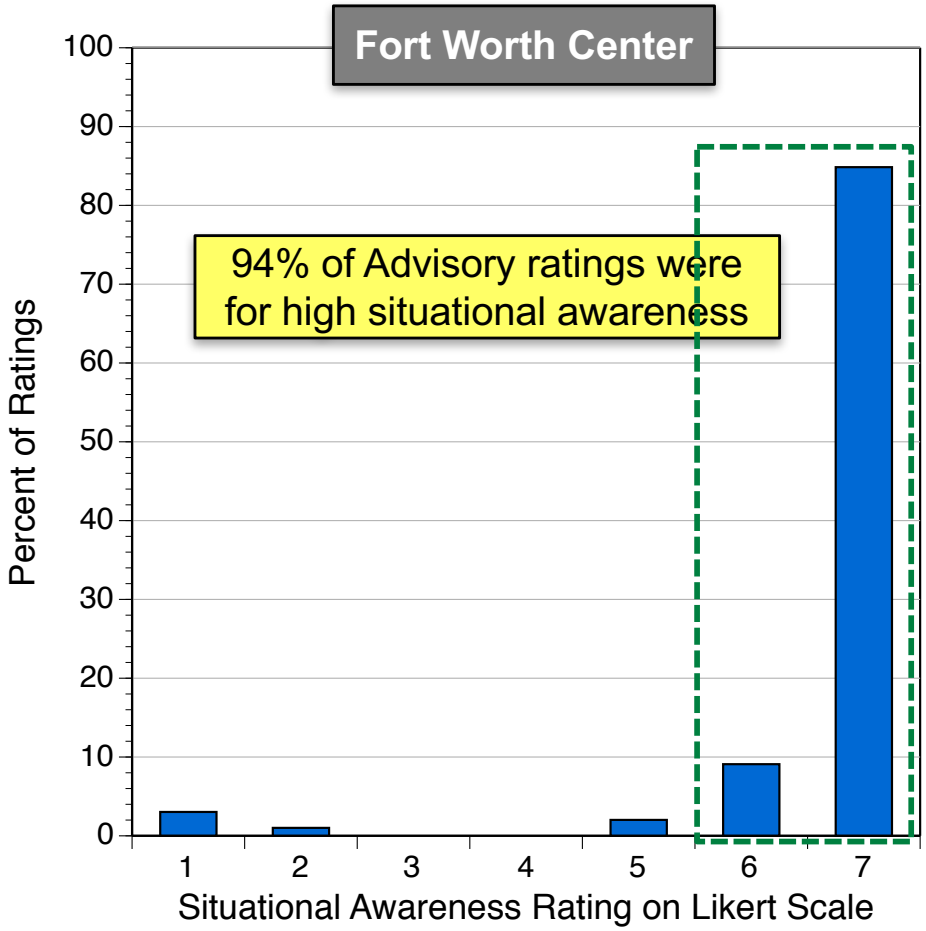
- User interface provides functionality to quickly/easily make route modifications with feedback on performance measures

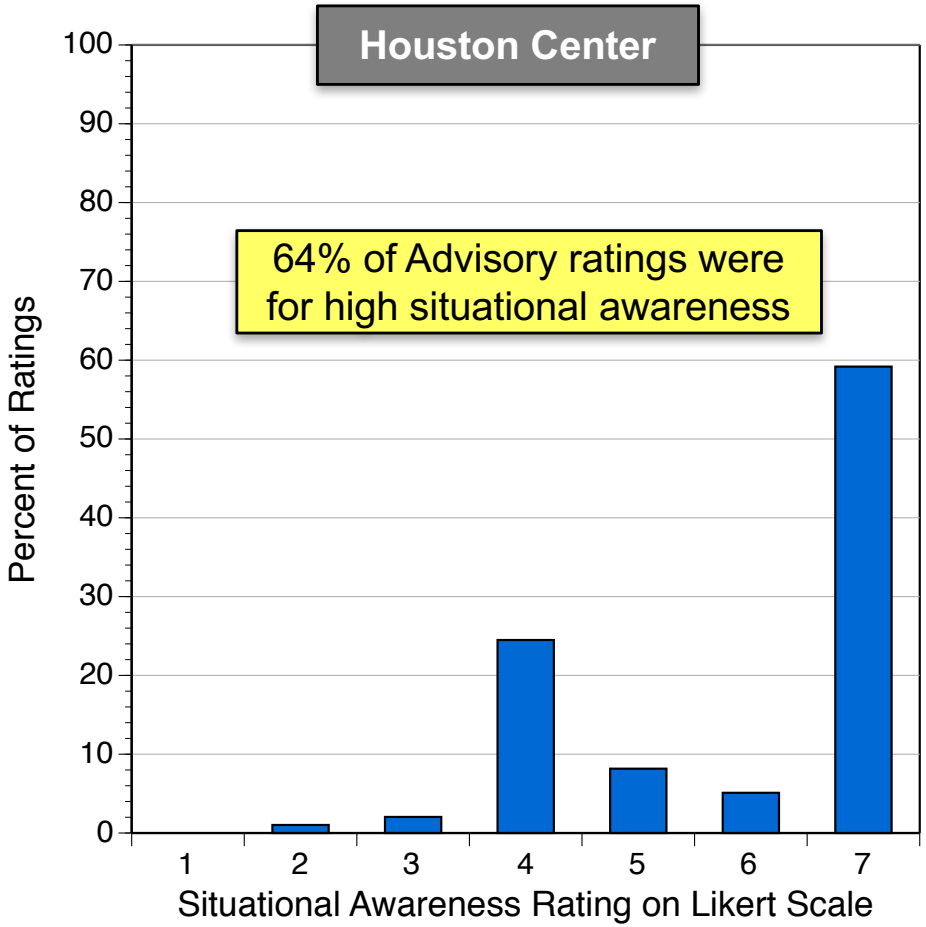
Workload Ratings





Situational Awareness Ratings





Conclusions

- MFCR received favorable evaluation from SMEs
- Good acceptability of final/modified MFCR advisories:
  86% for ZFW and 75% for ZHU
- Low workload to evaluate and modify MFCR advisories:
  80% for ZFW and 56% for ZHU
- MFCR user interface provides good situational awareness:
  94% for ZFW and 64% for ZHU
- MFCR is a good example of human-automation teaming

Questions?

karl.bilimoria@nasa.gov